

Herd health management and fertility parameters



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Reproductive performance: the number of cows that got pregnant divided by the number of cows that were eligible to get pregnant.

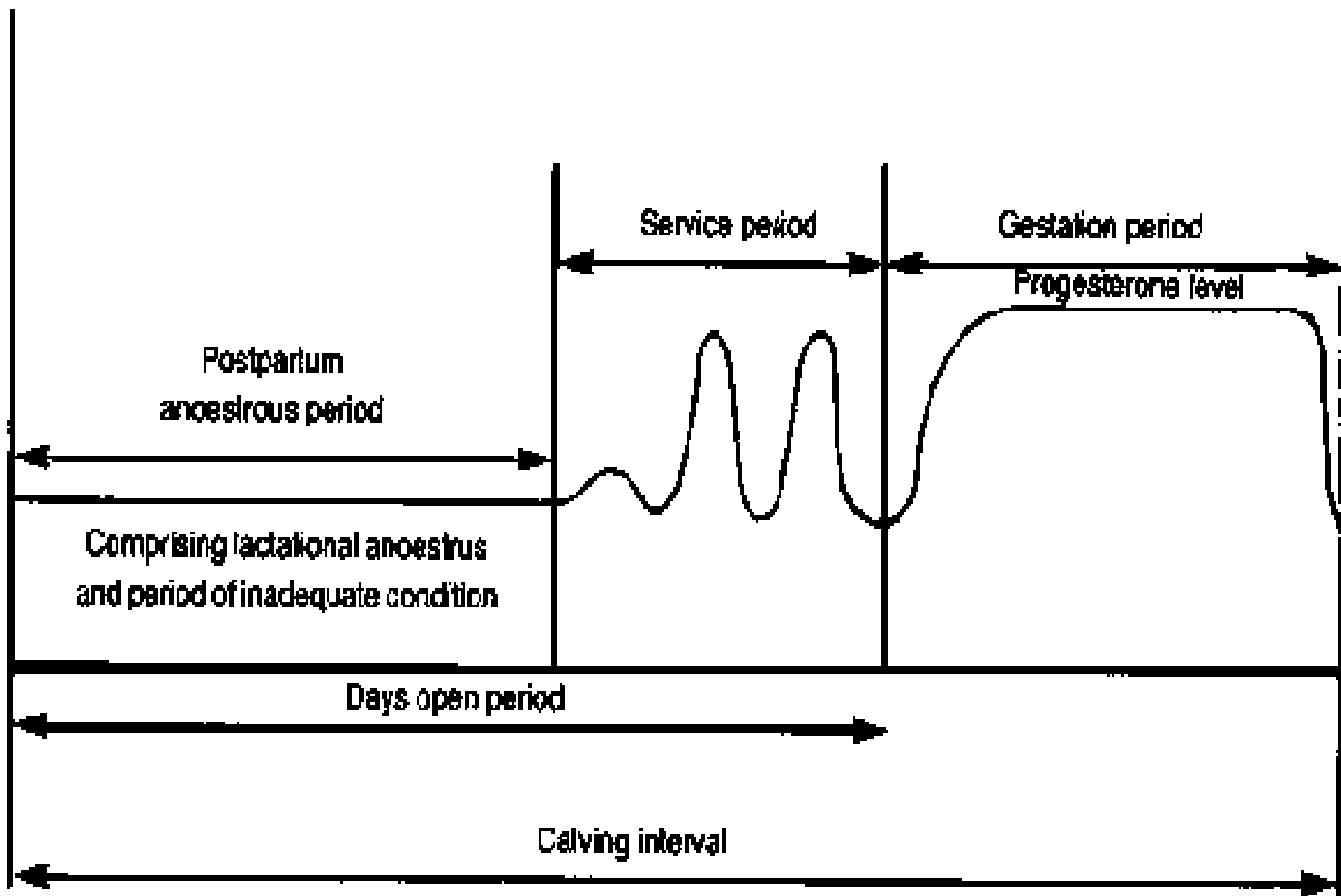
- Age at first calving
- Days open
- Calving interval
- Service period
- Conception rates
- Dry period
- **Reproductive Efficiency**
- The reproductive efficiency means the more number of calves during life time, so that total life time production is increased,

$$\text{Services per pregnancy (conception)} = \frac{\text{Total matings to pregnant cows}}{\text{Total number of pregnant cows}}$$

$$\text{Calving Interval} = \frac{\text{Number of months from previous to current calving}}{\text{Number of cows in calving (numerator) group}}$$

$$\text{Days Open} = \frac{\text{Total days from calving to conception for pregnant cows} + \text{days from calving to current date for open cows}}{\text{Number of breeding cows in the herd}}$$

Common measures of reproductive performance
used in dairy herds.



Age at first calving

- Gir cows: Affected by period of calving
- Progeny birth year, birth season and progeny sire had important bearing on bringing about improvement in age at first calving in Sahiwal cattle at Jharkhand rural conditions.
- The genetic correlation between WFC and AFC in Gir cows was positive and significant
- In field surveys the age at first calving in Rathi and Tharparkar varied from 36-48 months and 42-60 months and was affected by rains.

The average age at first calving in Indian cows is about 44 months (Table 1), compared with about 34 months in *Bos taurus* and *Bos indicus* x *Bos taurus* crosses in the tropics.

Breed	Location	Age at first calving (months)	Reference
Red Sindhi	India	35.6	Basu et al (1979)
Sahiwal	India	35.8	Basu et al (1979)
Tharparkar	India	37.2	Basu et al (1979)
Haryana	India	42-56	Luktuke and Subramanian (1961)
Nagori	India	47.43 ±1.06	Sharma (1983)
Non-descript	India	58.6 ±1.0	Singh and Raut (1980)
Haryana	India	51	McDowell (1971)
Ongole/Nellore	India	48-54	Bais et al. (2012)
Kankrej	India	47.78	Khirari et al. (2014)
Gir	India	45.8	Mathur and Khosla, (1993)
Deoni	India	54-60	Bais et al. (2012)
Red Sindhi	India	52.7	Pundir et al., (2007)
Rathi	India	44-57	Sharma, 1998

Heritabilities of age at puberty, at first conception and at first calving are generally low (Table 2), indicating that these traits are highly influenced by environmental factors.

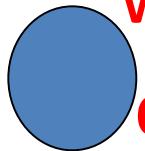
Cattle type	Heritability	Reference
Sahiwal	0.20	Mahadevan et al (1962)
Gir	0.20 ±0.11	Singh et al (1981)
Haryana	0.24 ±0.02	Jegan and Tomar (1983)
Haryana	0.3 ±0.27	Kumar and Bhat (1979)

Fertility (calving) rates

- Fertility in cattle is affected by genetic and environmental factors, disease and management factors.
- The commonest estimate of fertility rate is the percentage of mated or inseminated cows that become pregnant (pregnancy rate) or finally calve (calving rate).
- Fertility rates can currently be estimated more precisely using plasma progesterone, transrectal ultrasonography that can also evaluate embryonic deaths.

Fertility relates to

- Follicle development and maturation
- Estrus onset
- Successful coitus/ AI
- Ovulation
- Fertilization
- Implantation
- Development and delivery of the fetus and its membranes



World standard for fertility is the
conception rate

Fertility is affected by various factors

- Age: Fertility declines with increasing parities
- Production : Increased milk production decreased fertility
- Disease: Mastitis, retained placenta
- Artificial control of estrus
- Nutrition
- Management

Services required per conception is the standard for assessment of the problem

- At conception rates of 70, 60, and 50 percent 2.7, 6.4 and 13.0% of healthy cows require 4 services to conceive.
- Low conception rates could be because of sub-optimal semen quality, faulty AI, poor hygiene and with poor CR the number of services required may further increase

Indices to asses the severity of herd problem of low fertility

Assesment Index	Normal	Slight problem	Moderate problem	Severe problem
% pregnant to a given service	>65.0 – 60.1	50.1 - 60.1	45.0 – 50.0	< 50.0
Services/ Conception of all served cows	<1.54 – 1.66	1.99 – 1.66	2.2 - 2.0	> 2.2
Calving to service interval Days	<60.0 – 65.0	70.0 – 65.1	85.0 – 70.1	> 85.0
Days Open (Calving to conception)	<80.0 – 82.5	85.0 – 82.6	100.0 – 85.1	> 100.0
% submission of all calved cows	> 80.0 – 70.1	60.1 – 70.0	45.0 – 60.0	< 45.0
Non detected estrus	>10.0 – 14.9	19.9 – 15.0	40.0 – 20.0	>40.0
Heat detection rate	> 90.0 – 85.1	80.1 – 85.0	60.0 – 80.0	< 60.0
18-24 day return intervals	> 65.0 – 62.5	60.1 – 62.4	50.0 – 60.0	< 50.0
% needing 3 services	< 12.3 – 15.9	24.9 – 16.0	30.2 – 25.0	> 30.0
% needing 4 services	<4.3 – 6.3	12.4 – 6.4	16.6 – 12.5	> 16.6
Culled as empty / year	< 5.0 – 7.1	10.1 – 7.2	13.0 – 10.0	> 13.0

- Estimates of the repeatability of calving interval range from near zero to 0.37. Heritability estimates range from 0.003 to 0.33.

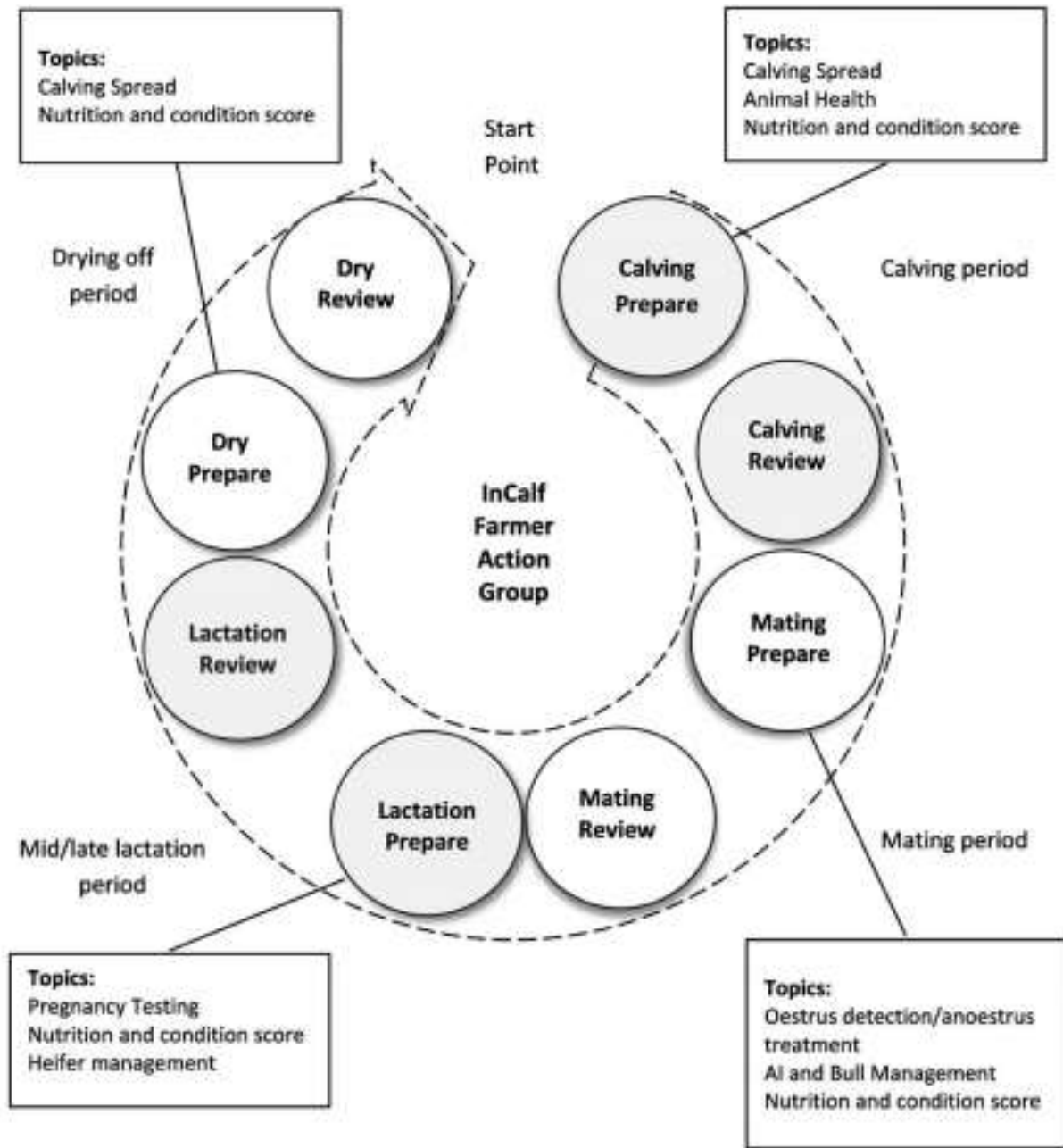
Number of services per conception

- The number of services per conception (NSC) depends largely on the breeding system used. It is higher under uncontrolled natural breeding and low where hand-mating or artificial insemination is used.

- There are a number of key areas for improving fertility management these include:
 - i) handling of substantial volumes of data,
 - ii) genetic selection (including improved phenotypes for use in breeding programmes),
 - iii) nutritional management (including transition cow management),
 - iv) control of infectious disease,
 - v) reproductive management (and automated systems to improve reproductive management),
 - vi) ovulation / estrus synchronization,
 - vii) rapid diagnostics of reproductive status, and
 - viii) management of male fertility

Genetic strategies to improve reproduction

- Breeding programmes in the early part of this century started to include fertility (e.g., by including traits such as longevity and calving intervals) and health as part of the selection traits.



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